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Original Article

Effect of Gait Retraining on Balance, Activities of Daily Living, Quality of Life and Depression in Stroke patients

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Objectives: Stroke is one of the most common neurological diseases and it is the main cause of physical and mental disability and staying in house. Gait difficulties have high incidence in patients with stroke. So the aim of this study was to investigate the effect of gait retraining on balance, activities of daily living, quality of life and depression in stroke patients

Methods: This study was a clinical trial without control group. Sampling was performed by convenience sampling method and 18 patients participated. After recording demographic data, Berg Balance Scale, Barthel Index, SF36 questionnaire and Beck Depression Inventory-II used in pre-test and post-test to assess balance, activities of daily living, quality of life and depression, respectively. Data were analyzed using Pearson correlation coefficient and paired T-test.

Results: The results showed statistically significant correlation in pre-test and difference between mean score of the all instruments before and after the intervention.

Discussion: According to high prevalence of gait difficulties in stroke patients, it seems interventions in this area were necessary. Statistical results showed that the gait retraining intervention may have a positive effect on improving balance, activities of daily living, quality of life and depression of these patients. According to lack of information in this area, further research is needed.

Keywords: Stroke, Gait retraining, Balance, Activities of Daily Living, Quality of Life, Depression
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Introduction

Stroke which is an ischemic or infarct injury of brain results in neurological deficit and contralateral impairments in verbal, cognition, motor and sensory system (1). It ranks as the sixth highest cause of burden of disease worldwide in terms of disability adjusted life years and is the single most important cause of severe disability in people living in their own homes (2). However, as most patients with stroke survive the initial injury, the biggest e□ect on patients and families is usually through long term impairment, limitation of activities (disability), and reduced participation (handicap). Physical disability of stroke may have a tremendous impact on the patient's functionality or capacity to perform activities of daily living (2). Ability to perform ADL is severely affected in patients with motor limitations such as cerebral palsy (3) and stroke (4). Previous studies have shown that ability to perform ADL and suffering from After Stroke Depression (ASD) are the key factors influencing Quality of Life (QOL) (5, 6). Thus, Difficulties in ADL may affect ASD and decrease the quality of life. Balance impairments is the common limitations that affect the functional mobility gait of stroke patients and one of the prevalent physical limitations contributing to stroke-related disability is walking dysfunction (7). Approximately one-third of people surviving

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acute stroke are unable to walk three months after admission to a general hospital (8). Walking dysfunction reduces the probability of successfully returning to work and decreases participation in community activities (9) and result in significant impact on the independence, quality of life and productivity of the survivors (10). Significant relations were also reported between ASD and QOL (11) and it has been shown that ASD effect negatively the QOL (12). As a consequence, improved walking function is a major goal of rehabilitation in individuals post stroke. Regarding the chronic nature of stroke outcomes and its long-term effects on a patient's life, in this study, the purpose was to investigate the effect of gait retraining on ADL, depression, balance and QOL in stroke patients.

Methods

This study was part of the Master of Science thesis and approved by "Shaheed Beheshti University of Medical Sciences" Ethics committee. Total of 18 individuals with hemiparesis post-stroke were recruited for this quasi-experimental study from Tabasom Rehabilitation Center. Participants were selected based on the inclusion criteria that consisted of: 1) diagnosis of CVA by a neurologist; 2) minimum of 6 month after their last stroke occurrence; 3) ablility to walk 10 m independently; 4) absence of obvious musculoskeletal disorders, congenital abnormalities; 5) absence of acute disorders such as cancer and/or tumors; 6) absence of intellectual disability; and 7) no history of drug abuse. All participants were provided with the information sheet and ensured that their participation in the research is voluntary and they were able to withdraw from the study in every stage of the data collection process. Following their consent, data were collected in the participant's convenient time and day. Participants were assured of the confidentiality of information. The group (n=18) received PNF mat activities and gait training performed by a physical therapist 30 min three times a week for 6 weeks. The PNF mat activities included resisted pelvic and lower extremity movement patterns. PNF gait training involved resistance applied by the therapist to the patient's pelvis during weight shifting forward over the paretic leg and as the patient stepped forward and backward with the no paretic leg. This was followed immediately by manual resistance applied at the pelvis during continuous walking. The subjects were allowed to take rest breaks as needed. After PNF activities over ground walking training was conducted around a flat, oval, indoor walking track of 130 m in circumference. Participants used their typical assistive devices, if desired, and were instructed to walk at their fastest possible pace without exceeding the moderate intensity level. The majority of participants in the over ground walking training received only verbal cues. Manual cues were seldom provided due to lack of consistency and safety. There were four tools for collecting data including: A questionnaire containing general and medical information such as sex, age, duration of illness. The Barthel Index (BI) was used to assess daily function status and independency in 10 activities including bowel, bladder, grooming, toilet use, feeding, transfer, mobility, dressing, steps, and bathing. Each item was assessed and scored separately. Scores ranged from 0 to100, in which 100 shows independency and zero demonstrates a complete dependency of the patient (13). And SF-36 questionnaire was used to assess Quality of Life. The SF-36 consisted of two main components (i.e., physical and mental) via eight subscales of functioning which eventually will have a score between zero and 100, so that higher scores indicate better quality of life is achieved (14). The BDI-II was used to assess depression among patients (15-17).

The original BDI, consisted of 21 questions about how the subject has been feeling in the last week (18). Each question has four possible answer choices based on intensity, including the following scores: zero (I do not feel sad), 1 (I feel sad), 2 (I am sad all the time and I can't snap out of it), and 3 (I am so sad or unhappy that I can't stand it). The total score is calculated to determine the depression's severity. The BDI-II was a 1996 revision of the BDI with the standard cut-off points as below: 0-13: minimal depression; 14-19: mild depression; 20-28: moderate depression; and 29-63: severe depression. Berg Balance Scale (BBS) which consists of 14 items (5 static and 9 dynamic) to assess the balance of the individual. Each item is scored from zero (unable to do) and four (normal function). Final score will be zero to 56 and higher scores indicating a better balance status (19). Among these tools, SF-36 and BDI-II was completed through an interview with patients or their caregiver, and BI and BBS were filled by observation. All assessments were done in a relaxed environment without any stressor stimuli in pre-test and post-test. All assessment in pre-test and post-test were done by a physiotherapist and

interventions were done by another person. If necessary there was 15-20 minutes rest period during assessments. During assessments the patient's general condition, fatigue, pain and consciousness were controlled. The instruments mentioned above were translated, and culturally adapted and validated for the people with Persian language (13, 14, 19, 20). For data analysis, SPSS ver. 18.0 was used for averages and standard deviations. Data normality was tested using Kolmogorov-Smirnov test, and all variables showed normal distribution. Pearson correlation coefficient was used to assess the various possible relationships among different variables and paired T-test was used for comparison of within group. Significance level was set at 0.05 for all analyses.

Results

Eighteen person (11 men and 7 women), mean age 58.11 (SD=±5.24) years at an average of 7.61 (SD=±1.42) months post stroke participated in the study. The demographical characteristics of the patients are shown in Table (1).

Table 1. Participant Characteristic

Characteristic	N=18
Mean± Standard Deviation	
Age (years)	58.11 ± 5.24
Gender (M/F)	11.7
Marital status	
Single	1
Married	10
Widowed	3
Divorce	4
Height (cm)	170.54 ± 7.8
Weight (kg)	78.67 ± 7.8
Affected Side (R/L)	15.3
Time since stroke (months)	7.61 ± 1.42
Dominant side (R/L)	17.1

Analytical studies of pre-test scores showed a significant negative correlation between ability in ADL performances and ASD ($r=-0.791$; $p<0.001$). On the other hand, a strong positive correlation were found between ADL performances and QOL ($r=0.978$; $p<0.001$), ADL and BBS ($r=0.675$; $p<0.002$). Also There was a significant negative correlation between ASD and QOL ($r=-0.823$; $p<0.001$), ASD and BBS ($r=-0.584$; $p<0.011$) and finally There was a significant correlation between BBS and QOL ($r=0.679$; $p<0.002$) The paired T-test analysis revealed statistically significant differences for all primary and secondary outcome measures at follow-up. There were significant differences (mean±SD scores): Barthel Index (86.11±6.76 vs 95.28±4.2, $p<0.001$), Beck Depression Inventory (18.56±5.73 vs 13.33±5.11, $p<0.000$), SF36 Questionnaire (45.62±8.36 vs 6.63±9.11, $p<001$) and Berg Balabce Scale (37.72±6.45 vs 47.11±5.24, $p<001$).

Discussion

The purpose of this study was to determine whether gait retraining improved balance, activities of daily living, quality of life and depression in persons with stroke. Based on the statistically significant improvements, it appears that gait retraining had a positive impact on the group of participants. Seok Woo Park et al reported that general rehabilitation program is effective at improving the balance ability of stroke patients(21) and better balance cause in gait improvement (22). Berg et al reported a strong correlation between functional and motor performance and Berg Balance Scale scores in patients with stroke (23).As a rehabilitation intervention, PNF training also led to gait improvement (24). Based on this finding, it seems that interventions affect gait and balance ability of patients and this improvement cause better function based on Barthel Index. Studenski et al report that rehabilitation exercise program led to improvement in ADL and QOL(25) that is similar to this study. Also Findings of this study were consistent with study of Haghgoo et al that reported correlation between ADL, ASD and QOL(11), so it appears that ADL improvement may enhance QOL in stroke patients. Our findings about ASD were similar to previous study that reported exercise training for ambulatory stroke patients was feasible and led to improvement in QOL, ADL and depression (26). Similar to findings, researchers have reported that severity of depression was significantly correlated with disability in ADL performances (27) so it seem improvement in one of them may affect the other one.

Conclusion

This study show a defect cycle that include common problem (balance, activities of daily living, quality of life and depression) after stroke. Any intervention like gait retraining that interrupt this cycle at any point may affect the other problem. According to lack of information in this area, further research is needed.

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References

1. O'Sullivan SB, Schmitz TJ, Fulk G. Physical Rehabilitation: F. A. Davis Company; 2013.
2. Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. The lancet. 2013;380(9859):2197-223.
3. Morales N, Funayama C, Rangel VO, Frontarolli AC, Araújo R, Pinto R, et al. Psychometric properties of the Child Health Assessment Questionnaire (CHAQ) applied to children and adolescents with cerebral palsy. Health and quality of life outcomes. 2008;6(109):1-10.
4. Larson J, Franzén-Dahlin Å, Billing E, Arbin M, Murray V, Wredling R. Predictors of quality of life among spouses of stroke patients during the first year after the stroke event. Scandinavian journal of caring sciences. 2005;19(4):439-45.
5. Carod-Artal FJ, Trizotto DS, Coral LF, Moreira CM. Determinants of quality of life in Brazilian stroke survivors. Journal of the neurological sciences. 2009;284(1):63-8.
6. Gaete JM, Bogousslavsky J. Post-stroke depression. 2008.
7. Perry J, Garrett M, Gronley JK, Mulroy SJ. Classification of walking handicap in the stroke population. Stroke. 1995; 26(6):982-9.
8. Langhorne P, Coupar F, Pollock A. Motor recovery after stroke: a systematic review. The Lancet Neurology. 2009;8(8):741-54.
9. Treger I, Shames J, Giaquinto S, Ring H. Return to work in stroke patients. Disability & Rehabilitation. 2007;29(17): 1397-403.
10. Obembe AO, Olaogun MO, Adedoyin R. Gait and balance performance of stroke survivors in South-Western Nigeria-A cross-sectional study. The Pan African medical journal. 2014;17(Suppl 1).
11. Haghgoo HA, Pazuki ES, Hosseini AS, Rassafiani M. Depression, activities of daily living and quality of life in patients with stroke. Journal of the neurological sciences. 2013;328(1):87-91.
12. Kwok T, Lo RS, Wong E, Wai-Kwong T, Mok V, Kai-Sing W. Quality of life of stroke survivors: a 1-year follow-up study. Archives of physical medicine and rehabilitation. 2006;87(9):1177-82.
13. Mahoney FI. Functional evaluation: the Barthel index. Maryland state medical journal. 1965;14:61-5.
14. Motamed N, Ayatollahi A, Zare N, Sadeghi Hassanabadi A. Validity and reliability of the Persian translation of the SF-36 version 2 questionnaire. 2005.
15. Viinamäki H, Tanskanen A, Honkalampi K, Koivumaa-Honkanen H, Haatainen K, Kaustio O, et al. Is the Beck Depression Inventory suitable for screening major depression in different phases of the disease? Nordic journal of psychiatry. 2004;58(1):49-53.
16. Aalto A-M, Elovainio M, Kivimäki M, Uutela A, Pirkola S. The Beck Depression Inventory and General Health Questionnaire as measures of depression in the general population: a validation study using the Composite International Diagnostic Interview as the gold standard. Psychiatry research. 2012;197(1):163-71.
17. Ghassemzadeh H, Mojtabai R, Karamghadiri N, Ebrahimkhani N. Psychometric properties of a Persian-language version of the Beck Depression Inventory-Second edition: BDI-II-PERSIAN. Depression and anxiety. 2005;21(4):185-92.
18. ERBAUCH J. An inventory for measuring depression. 1961.
19. Azad A, Taghizadeh G, Khaneghini A. Assessments of the reliability of the Iranian version of the Berg Balance Scale in patients with multiple sclerosis. Acta Neurol Taiwan. 2011;20(1):22-8.
20. Oveisgharan S, Shirani S, Ghorbani A, Soltanzade A, Baghaei A, Hosseini S, et al. Barthel index in a Middle-East country: translation, validity and reliability. Cerebrovascular diseases (Basel, Switzerland). 2005;22(5-6):350-4.
21. Park SW, Lee KJ, Shin DC, Shin SH, Lee MM, Song CH. The effect of underwater gait training on balance ability of stroke patients. Journal of physical therapy science. 2014;26(6):899.
22. Yavuzer G, Eser F, Karakus D, Karaoglan B, Stam HJ. The effects of balance training on gait late after stroke: a randomized controlled trial. Clinical rehabilitation. 2006;20(11):960-9.
23. Berg KO, Wood-Dauphinee SL, Williams JI, Maki B. Measuring balance in the elderly: validation of an instrument. Canadian journal of public health= Revue canadienne de sante publique. 1991;83:S7-11.
24. Stephenson JB, Maitland ME, Beckstead JW, Anemaet WK. Locomotor Training on a Treadmill Compared with PNF Training in Adults with Chronic Stroke. Technology & Innovation. 2014;15(4):325-32.
25. Studenski S, Duncan PW, Perera S, Reker D, Lai SM, Richards L. Daily functioning and quality of life in a randomized controlled trial of therapeutic exercise for subacute stroke survivors. Stroke. 2005;36(8):1764-70.
26. Mead GE, Greig CA, Cunningham I, Lewis SJ, Dinan S, Saunders DH, et al. Stroke: a randomized trial of exercise or relaxation. Journal of the American Geriatrics Society. 2007;55(6):892-9.
27. Herrmann N, Black S, Lawrence J, Szekely C, Szalai J. The Sunnybrook stroke study a prospective study of depressive symptoms and functional outcome. Stroke. 1998;29(3):618-24.